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canusa Newsletter

Canada
United States
Spruce Budworms
Program

NUMBER 17, JULY 1981

Utilization Studies in The Lake States

The use of balsam fir threatened or damaged by spruce budworm presents an interesting problem to the forest products industry. Mature balsam fir generally comprises small to medium-size trees, 12 to 18 m (40 to 60 ft) in height and 30 to 45 cm (12 to 18 in.) in diameter. The wood is light in weight and color and has moderate strength properties. Balsam fir damaged by spruce budworm attack is susceptible to secondary attack from insects and fungi. This secondary attack generally creates a material less valuable and harder to use. With the growing need for better utilization of forest resources, the question, "Should this balsam fir resource be utilized?" has been replaced with "How should this resource be utilized?"

The balsam fir and spruce resource in the Lake States consists of 119 million m^3 (4,200 million ft^3) of growing stock on commercial forest lands. The net annual growth is reported to be approximately 4.5 million m^3 (157 million ft^3), whereas the industrial roundwood removals are only 1.6 million m^3 (56 million ft^3) in the Lake States. These figures show the industrial roundwood removals to be significantly lower than the net annual growth, indicating the potential for increased timber removals.

In addition to the healthy balsam fir resource available on commercial forest lands, there is the threatened or already damaged resource. Spruce budworm defoliation data collected in the Lake States during 1979 showed 60 000 ha (150,000 acres) of light to medium defoliation in Minnesota; 56 500 ha (141,300 acres) of light to heavy defoliation in Wisconsin; and 29 400 ha (73,600 acres) of light, 59 000 ha (147,600 acres) of moderate, and 15 000 ha (37,600 acres) of heavy defoliation in Michigan. These figures represent approximately one-quarter of the commercial forest land area in balsam fir/white spruce forest type, and preliminary estimates indicate that 1981 will be another active year for the spruce budworm in Minnesota.

There are two potential sources of usable balsam fir. The first, mature balsam fir, is most susceptible to budworm attack when the stand is mainly mature balsam fir. Underutilization of the mature stands of healthy balsam fir will generally maintain the forest in a susceptible state. An increase in utilization of mature balsam fir stands should bring some relief and provide economic benefits. The second source is balsam fir already damaged by budworm attack; the use of these trees could extend the resource and beneficially affect future forest management techniques.

The University of Minnesota's Forest Products Department has undertaken a project to determine the potential for increased balsam fir utilization. The major objectives are (1) to obtain technical data and marketing information to establish guidelines for the utilization and distribution of balsam fir for a variety of products and end uses; (2) to determine the economic potential for increased utilization using an economic decision model based on predicted product qualities, market prices, and production costs.

The project was initiated by establishing field plots within spruce budworm infested balsam fir stands in northeast Minnesota. Field crews identified individual trees prior to death and, every month from May through October, observed external tree characteristics to determine the date of tree death. In addition, workers monitored the moisture content of approximately 40 trees and removed increment cores from the trees during the observation field trips. Special attention was paid to variations in moisture content in dead and dying trees because such variations may significantly affect final product quality, particularly in the composite panel products, and could have a beneficial effect on drying solid wood products.

Balsam fir has the potential for increased use as dimension lumber. Its light color, straight grain, and small, tight knots all contribute to its suitability for this application.

An initial sawmill study was conducted using approximately 3 000 board m (10,000 board ft) of 2.5-m (100-in.) bolts of healthy balsam fir. A circular heading, followed by a bull edger, was used to cut the bolts into dimension lumber with a minimum of 2.5-cm (1-in.) boards. The lumber grade yields from this study show approximately 68 percent of the 5 x 15 cm (2 x 6 in.) dimension lumber to be No. 2 and Better grade, with 40 percent of it being Select Structural grade. The 5 x 10 cm (2 x 4 in.) dimension lumber yields showed 75 percent of the lumber grades to be Standard or Better, again with most of the lumber falling into the upper grade of Construction. It should be noted that these figures are the yields after drying and surfacing.

A second grade-yield study was conducted, during the fall of 1980, on budworm-killed balsam fir dead for 1 year. The data from this study are being analyzed. A final grade-yield study is planned for the fall of 1981 using budworm-killed balsam fir dead 2 years. In addition to grade-yield studies, mechanical property evaluations of the grade-yield material and small clear specimens are currently being performed.

This project is also examining the prospects for using healthy and dead balsam fir in the manufacture of composite panel products. Balsam fir's desirable properties of low density, high compressibility, and suitability for gluing make it an excellent candidate for composite panel products. Both waferboard and ring flake board are being made from healthy and budworm-killed balsam fir dead for 3 months, 12 months, and 24 months before harvesting. In addition, the various categories of balsam fir are being mixed with an aspen furnish to produce an aspen/balsam fir composite panel.

Preliminary studies showed that both healthy and budworm-killed balsam fir waferboard yielded strength properties above the minimum required in the U.S. Commercial Standard, CS 236-66, for type 2B2 particleboard. This preliminary study also showed a decrease in chip quality and an increase in the amount of fines produced during the waferizing of dead balsam fir. These problems can be minimized by increasing the moisture content of the dead material before waferizing.

Another area of interest to researchers on this project is the use of balsam fir in pulp and paper manufacturing. Studies are being conducted to determine the suitability of budworm-killed balsam fir as a pulp furnish. Healthy, 1-year-dead, and 2-year-dead balsam fir are being pulped by the Kraft process and the thermomechanical process (TMP).

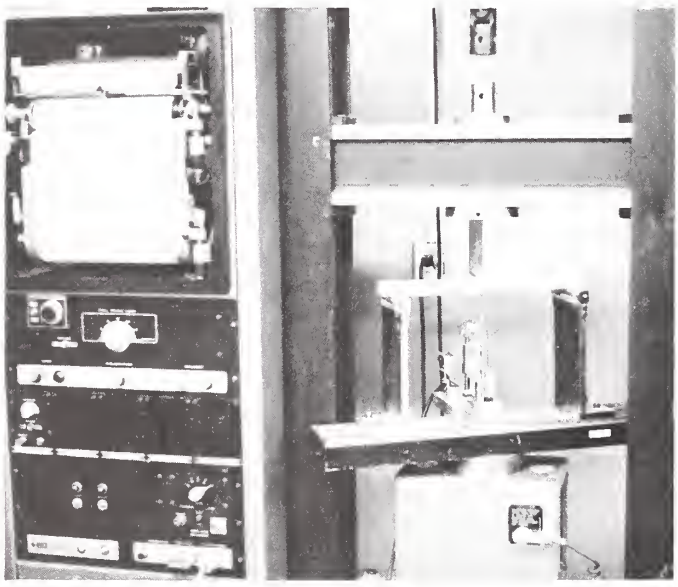
The TMP pulps produced from healthy and 3-month-dead balsam fir showed similar strength properties but different optical properties, at the same Canadian Standard freeness levels. Initial Kraft pulping studies of healthy balsam fir indicate the pulp yield increases from the top to the bottom of the tree, and fiber yields have ranged from 41 percent to approximately 45 percent.

There are apparently technical, marketing, or economic constraints on the use of balsam fir in the Lake States. Identifying these constraints is of direct concern to researchers, who have identified few constraints of a technical nature and are directing marketing research activities at uncovering any prevailing market constraints. The final segment of this research effort will analyze all previously collected information to determine if major economic constraints are preventing utilization of balsam fir. This analysis will be translated into economic decision models and management guidelines for using balsam fir. Such information will aid land-owners and timber buyers in selecting optimum utilization strategies for balsam fir threatened or damaged by budworm.

Steven A. Sinclair — Assistant Professor
Department of Forest Products
University of Minnesota
St. Paul.



Balsam fir dimension lumber in preparation for mechanical properties evaluation.



Small clear specimen evaluations of the mechanical properties of balsam fir.

One Step Toward Spruce Budworm IPM In The Lake States Region

Over the past dozen years or so, changes in the field of pest control have come about because it has been seen that relying on chemical pesticides alone can be economically, environmentally, and socially more costly than beneficial. The newly adopted philosophy — integrated pest management (IPM) — emphasizes using a variety of methods to address pest problems in environmentally and socially responsible ways. The most notable examples of changes in management as a result of adopting the IPM philosophy have emerged in agriculture, where pest control accounts for a large percentage of production costs. Cotton and tree fruit production have perhaps seen the greatest changes in technology as a result of IPM. Other areas of pest control, including forest pest control, have changed less, because of the lack of economic incentives.

The IPM philosophy has provided a stimulus for the development of tactics to address problems created by a wide variety of pests (e.g., insects, diseases, nematodes, weeds, certain wildlife). Highly refined IPM systems accounting for all possible pests in all possible circumstances, however, are not currently available. Adopting an IPM philosophy will stimulate incremental changes in pest control tactics; the ultimate IPM system, however, will always be the target.

Extensively managed forests provide the least incentive for IPM, largely because the economic justification for any pest control activity is severely limited there. Consequently, the sophistication of IPM technology for extensively managed forests is also limited.

The spruce-fir forest is an extensively managed natural forest. In the Lake States the spruce-fir forest type is underutilized and is considered of low value. Much of it has never been managed and is overmature. Since the early 1970s, a spruce budworm outbreak has engulfed the region and caused extensive tree mortality.

Foresters have impulsively reacted to the outbreak by attempting to increase presalvage activities. In some cases presalvage has been too late, with material too deteriorated for marketing; in other cases, when supplies have exceeded mill demands, the limited markets for raw spruce and fir made life difficult for harvesting contractors.

Spruce budworm is not the main problem in the Lake States: the real problem is the lack of marketing opportunity for spruce and fir. And because there is no way to implement a quick solution to the marketing problem, one might conclude that nothing can or should be done about the budworm. But a second scrutiny of the situation reveals more profound issues. Paper mills have recently expanded, are expanding, or will expand within the region in the near future. Some mills use spruce and fir exclusively while others add a percentage of softwood, including spruce and fir, to their hardwood pulping mixture. Obviously, then, spruce and fir will continue to be important to the region. The question is: How to contend with outbreaks and the current market conditions, and still provide for future expanding demand?

From a management perspective, dead and dying stands should not be the focus of our efforts. These stands are static as far as current conditions and the near future are concerned. They can either be salvagelogged (for minimal economic return to the landowner and cutting contractor) or they can be ignored. In either case they eventually may provide raw materials for mills in the distant future. Living stands, however, are dynamic. They represent current, near future, and distant future potential. It is within the living stands that our IPM efforts are focussed.

The concept is a simple one. There is little to be done about overmature stands now experiencing budworm pressures. For these stands there are three options: (1) harvest now, (2) spray now for budworm control and harvest in the near future, or (3) let nature take its course.

Slightly younger stands, representing some current market potential and definite near future market potential, can be treated by partial cutting to serve the current market instead of exceeding demand by vast presalvage cuts. By creating openings in these stands through cutting: (1) we help assure the immediate future supply of raw spruce and fir by holding it at lower risk for a time in partially cut residual stands, (2) we increase the resilience of such stands by favoring natural enemies and natural mortality factors, (3) we help assure a distant future supply of spruce and fir because they will eventually dominate the cutover areas, and (4) we base our actions on sound managerial economics.

Clearcutting the spruce-fir forest creates a disturbance, triggering the ecological process of secondary succession. Eventually spruce and fir will again dominate the area. In the meantime the land will experience several stages of other vegetation, including dense slash, raspberry and regenerating hardwoods, and dominant hardwoods. Small patches of these stages, interspersed with spruce-fir stands left alone, increase the diversity within healthy stands we wish to market in 5 to 20 years. The increased diversity lowers the risk of incurring economic damage from the spruce budworm because we not only change the composition of the forest, we also influence budworm mortality factors and natural enemies to our advantage.

The most obvious influence of interspersed cuttings is favoring plants and trees that are unsuitable for the budworm to feed on. The time in the spring when larvae disperse and establish feeding sites is crucial to the budworm. During this time the tiny larvae may undergo several dispersals, each of which can result in displacement to an unsuitable plant or tree and death of the larvae. Various studies suggest that larval mortality can be enhanced through manipulation of species mix in the stand to favor nonhosts.

Dispersal loss is not only confined to spring dispersal to unsuitable hosts; mortality may occur both in the fall and the following spring. Probable mortality factors operating during these times are air dispersal to nonhost material, predation and parasitism, failure to spin hibernacula, diapause-free development, and failure to establish feeding sites.

Although we cannot influence all these mortality factors through forest management, we can create forest conditions that influence predation and parasitism. Budworm mortality due to an egg parasite can be facilitated by increasing the diversity of plant and tree species, and by reducing crown closure. Parasitism by a variety of pupal parasites increases as stand density decreases. Bird predators, particularly those that feed on budworm, increase their numbers in the openings created by cutting. In addition, other invertebrate and vertebrate predators can probably be increased by the "edge effect" offered by small patch clearcuttings within a forest stand. Thus cutting — the major forest management variable we can control — can directly and indirectly influence the spruce-fir forest and, in turn, the spruce budworm that feeds upon it.

There are three ways that openings may be created in a spruce-fir stand: individual tree selection cutting, patch cutting, and strip clearcutting. Foresters and cutting contractors are sometimes reluctant to engage in selection cutting or patch cutting but feel that strip cutting is acceptable.

Strip cutting within spruce-fir stands has been done for about the last 20 years and was most common during the late 1960s. The reason it is done is quite independent of spruce budworm considerations. As opposed to large clearcuts, strip cuts favor the regeneration and survival of cedar, an essential element in habitat management for the whitetail deer. Even though strips were cut for reasons other than budworm control, we still have an excellent opportunity to evaluate and document the effectiveness and economic considerations requisite for strip cuts in spruce-fir management.

Procedures outlined in the previous paragraphs have been applied to demonstration areas. The project is being conducted under the umbrella of the Michigan Cooperative Forest Pest Management Program, a multiagency cooperative, and is under the direction of three principal cooperators: G.A. Simmons (Michigan State University), J.T. Olson (Forest Economist, Michigan Department of Natural Resources), and D.G. Mosher (Pest Management Program Leader, Michigan Department of Natural Resources). Foresters from the USDA Forest Service, Michigan Department of Natural Resources (DNR), and timber industries have cooperated fully in the venture. A major portion of the financial support for the project was granted by the USDA Forest Service, Northeastern Area, Forest Pest Management.

The objectives of the demonstration are: (1) to demonstrate the spatial distribution of cuts that will minimize subsequent spruce budworm damage, and (2) to employ economics as a final decision tool. Translating these aims into field practice, as usual, required some modifications of the original plans. The initial approach was to utilize a computer simulation model to explore optimum distributions of cuts and an economic analysis to provide decision criteria for cut vs no cut alternatives. The simulation model provided guidance as to the amount of open area that would alter budworm mortality, but residual tree mortality from windthrow and normal deterioration was unknown. Local mill demand was the greatest constraint in determining whether *any* action could be taken. For these reasons we contacted field foresters who had areas that could be cut and who knew contractors who would bid on the jobs. In addition, it became apparent that live areas containing pure spruce-fir would be difficult to find. Instead, areas selected would be those stands containing mixtures of other species, such as aspen and cedar.

After the harvest, we will conduct an economic analysis based on actual costs and benefits incurred. The type of cutting selected depends on what the foresters are willing to put up for sale and what loggers are willing to bid on, implying that specific field strategies will be based on the economic criteria of forester and logger. Detailed financial information will be documented for stumpage sales and harvest sales so that postaction analyses can be conducted.

We contacted area foresters with the Michigan DNR, the USDA Forest Service, and private industry for their assistance in developing the demonstration areas. General guidance and specifications were given as follows:

(1) Species composition: spruce-fir type with some hardwood component, either aspen or northern hardwoods.
(2) Area size: a minimum of 16 ha (40 acres) with an uncut check plot of no less than 4 ha (10 acres).
(3) Level of budworm damage: low to moderate level of feeding, with no widespread tree mortality or top kill.
(4) Suitability for harvesting: sufficient volume of timber so that partial cutting is commercially feasible; road-building costs and distance to mills are not prohibitive.

To date field crews have completed a strip cut with cuts 20 m (1 chain) wide and leave strips 40 m (2 chains) wide. A second strip cut area is in progress in which the cut strips are 40 m (2 chains) wide and the leave strips are 60 m (3 chains) wide. A third area, a patch cut, is also in progress.

Biological monitoring is being conducted in each treatment and paired check area. Among the parameters being measured are budworm densities and damage, budworm mortality, budworm parasitism, residual stand density and composition, and regeneration density and composition. After one full field season of monitoring, it is apparent that budworm densities are slightly lower and parasitism slightly higher in the residual stands interspersed with cuts.

One of the shortcomings of concentrating efforts on current cuts is that we cannot answer such questions as: How long can residual stands be left before they are destroyed by budworm? What success does this method offer as far as regeneration is concerned? What impact does the budworm have on spruce-fir regeneration in the strips? What influence do strips have on natural enemies as succession proceeds? Consequently, we are planning to add as many as four additional areas to our monitoring inventory. The additional stands were strip cut between 1960 and 1978 for wildlife habitat improvement. Some of the stands received treatment well before the spruce budworm outbreak. Some were cut long enough ago that they are now scheduled for harvest of the residual material. In most cases stumpage sale data and residual stand data are available. By adding these stands, a more complete picture of the operating concept can be painted and one step toward spruce budworm IPM in the Lake States region can be taken.

Gary A. Simmons — Associate Professor of Forest Entomology,
Michigan State University
East Lansing.

New Strategy For Pesticide Application

Gus Howitt, George Ayers (both of Michigan State University), and Chet Himel (University of Georgia) were among the participants at the University of Florida Symposium on Pesticide Application last March 25 and 26. All three are CANUSA cooperators funded to do research on pesticide application. Chet delivered a paper entitled "Analytical System for Pesticide Spray Transport and Impingement." Also speaking at this conference was Profesor R.J.V. Joyce from the Cranfield Institute of Technology in England. Joyce's paper was entitled "Ecological Selectivity with Pesticides through Target-Specific Methods of Application."

Several very thought-provoking ideas were included in the talks given by Himel and Joyce, ideas that were new (at least to me) and could have significant impact on the manner in which forest pest control operators try to suppress pest populations in the future. Their papers are definitely "recommended reading."

At the risk of misquoting by taking them out of context, I have summarized some of their ideas, as follows:

1. Customarily, sprayers try to lay down a "toxic carpet on all crop surfaces" with the result that most of the insecticide does not reach the target pest and is thus wasted. Needless to say, if we could hit the target more precisely, much less insecticide would do the job.
2. Most of the insecticide that does reach the target and causes insect mortality is in the form of small droplets, less than 100 microns in diameter. Large droplets tend not to penetrate well into crop foliage.
3. Large droplets (200 microns) are transported by "sedimentation processes" (cross winds and gravity) whereas small droplets have low sedimentation components and are transported by turbulent processes.
4. Insecticide sprayers must be designed to produce spray drop spectra that will be subject to turbulence. The objective should be "an optimum range near 50 microns or less." Further, spray devices must also incorporate effective turbulent transport — that turbulence produced by the airplane, by the spray device, or by favorable meteorological conditions.
5. For maximum deposit of small droplets on the target surface, "the height of release has to be increased as (air) turbulence increases. This is the reverse of generally accepted practices."
6. Spray formulations that result in droplet encapsulation will alleviate the evaporation problems inherent with small droplet sizes.

Since these summarized comments obviously do not do justice to the papers presented by Joyce and Himel, it is suggested that, if your interest has been piqued, you obtain and read the complete texts. They will be published by early summer as the Proceedings of the Florida Symposium on Pesticide Application. Requests for copies may be addressed to Chester Himel, Department of Entomology, University of Georgia, Athens, GA 30602

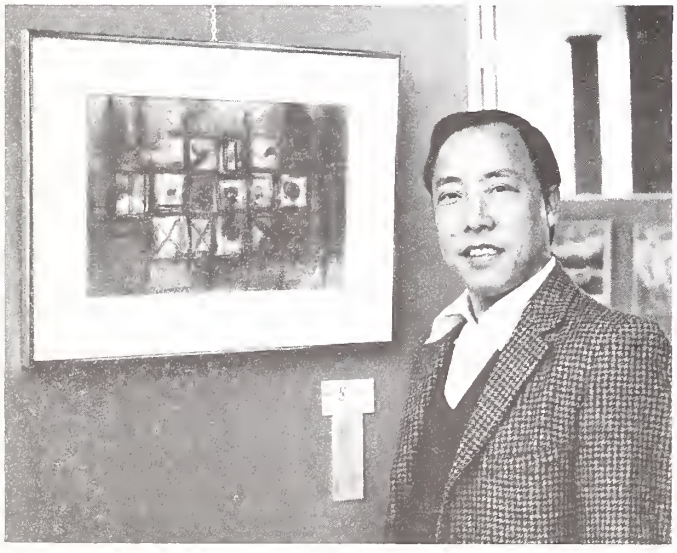
David G. Grimble — Applications Coordinator
CANUSA East
Northeastern Forest Experiment Station
USDA Forest Service
Broomall, PA

CANUSA Publication Wins Award

The CANUSA information folder "The Spruce Budworm Program in the East" has won a design award for Bing-Lin Wong, graphics designer with the Information Directorate at Environment Canada, Ottawa.

The award, the Certificate of Merit of the Canadian Society for Technical Communication (Eastern Ontario Chapter), was given to Mr. Wong for his work on a number of publications during the past year, including the CANUSA pamphlet.

Born in Kwongtung Province in southern China, Mr. Wong came to Canada in 1954 and graduated with honors from the Ontario College of Art. He has won a number of awards for his painting and has exhibited at several Canadian galleries as well as in Paris. He has worked for the Government of Canada since 1966.



ACAFA Executive Committee Meeting

The National Research Council of Canada's Associate Committee on Agricultural and Forestry Aviation (ACAFA) held its spring meeting March 18-19, 1981 at the Laurentian Forest Research Centre in Ste. Foy, Que. This was the second time within a year that the committee has received exposure to the spruce budworm problem in eastern Canada (see Newsletter No. 10). The meeting was top heavy with "budwormologists," with Bud Irving, Michelle Pelletier, Jean-Guy Davidson, and Chuck Buckner all carrying the budworm flag. In addition, Bob Blais presented an overview of the history and status of the beast in Quebec. Later, Jean Beaubien gave an illustrated talk on the Landsat Remote Sensing Program and its use in forestry problems, including the budworm, in Quebec.

Update On Pesticides

The Environmental Protection Agency (EPA) of the United States is still working on its Advisory Opinion that will allow use of pesticides at dilution rates less than specified by labelling (higher concentrations). Higher concentrations, as applied by low volume (LV) and ultra low volume (ULV) equipment, offers various advantages over other methods of application. EPA plans to allow such use if based on a written or published recommendation from an Agricultural Extension Service or appropriate local, state, or federal government agency.

According to EPA's latest draft, persons or organizations who make recommendations are warned that under state law they may be found liable for civil damages to persons who suffer harm as a result of their recommendations. More specifically, EPA says before issuing a recommendation under the Advisory Opinion, it would be prudent to make an evaluation to determine if it would result in (1) an unreasonable increase in risk to applicators, workers, or bystanders; (2) an unreasonable increase in risk of phytotoxicity to the target crop or nearby sensitive crops; (3) an unreasonable increase in risk to nontarget organisms, including birds, fish, wildlife, bees, and beneficial insects; (4) pesticide residues in excess of established tolerances for agricultural commodities.

The significance of EPA's draft opinion is that it does not exempt one from state law nor does it exempt one from the responsibility of making sound recommendations.

No RPAR For Carbaryl

EPA decided not to issue a Rebuttable Presumption Against Registration (RPAR) for carbaryl. The pesticide has been returned to its normal registration status.

EPA reviewed carbaryl because there is concern over two studies that found it teratogenic when administered in low doses to pregnant dogs. There is also concern that carbaryl causes tumors, genetic damage, nervous disorders, and viral enhancement.

Based on the weight of evidence currently available, EPA concluded that carbaryl, when used properly, does not present a human health hazard. Carbaryl was returned to registration with stipulations: (1) that additional teratogenicity and fetotoxicity studies be conducted on dogs and (2) that appropriate label changes be made to ensure exposure is minimized.

EPA Concludes RPAR On Dimethoate

EPA recently concluded the RPAR process for dimethoate. Dimethoate is a systemic insecticide sold under various trade names such as Cygon, De Fend, and Rebelate. It is used in forest seed orchards and nurseries and on ornamentals to control budworms and other important insects.

Based on the Dimethoate Position Document 4, EPA intends to cancel all registrations of the insecticide unless manufacturers modify their labels requiring that all applicators wear certain protective clothing and equipment. EPA also intends to deny the registrations of all dimethoate products for use in dust formulations.

Western Defoliation Survey

According to Forest Pest Management Report 81-1 (April 1981), defoliation by western spruce budworms is reduced in the Northern Rocky Mountains. For the first time since 1967, less than 800 000 ha (2 million acres) of budworm-caused defoliation were detected during the annual aerial survey of the region. Two new, small areas of defoliation occurred on the Clearwater and Idaho Panhandle National Forests (NFs). Defoliation increased substantially on the Custer and Gallatin NFs and in Yellowstone National Park but declined elsewhere in Montana's NFs.

Robert James and Jerald Dewey, authors of the report, note that record precipitation occurred in May and June, 1980, providing conditions nearly optimal for foliage growth but very poor for larval development. The authors "suspect this masked defoliation and that a population decline of the magnitude suggested by the reduction of defoliated acres mapped did not really occur. Limited larval and egg mass sampling supports this hypothesis." A recurrence of severe defoliation can be expected in 1981.

Insecticides For Spruce Budworm: One Down

CANUSA's Ad Hoc Committee on Data Sharing and Joint Registration of Insecticides reports, through Fred Honing, that Dow Chemical Company has decided not to pursue Stateside registration of Reldan® for use against spruce budworm. Bruce Miehle, Dow's Product Development Manager, states that the company has no interest in marketing Reldan® in the United States for forestry use. This decision appears paradoxical in view of the fact that the company is pursuing Canadian registration for chlorpyrifos-methyl and continues to promote its use in spruce budworm control north of the border.

Since Reldan® won't be available for forestry uses in the United States, methomyl (Lannate®) could serve as an alternative. The State of Maine is interested in pursuing all possible controls for budworm, including Lannate® . Unfortunately, its extreme toxicity has made for handling problems in the past, but DuPont has designed a package that should solve the problem. Lannate® is now available in water-soluble packets that eliminate the need for mixing-applicator personnel to touch the product or expose themselves to it through inhalation.

United States-West Can Be Reached Any Time

If you are interested in reaching someone at the Western U.S. Program Manager's Office but are unable to get through using their regular numbers, try the CANUSA-West Message Center. The Center is a computer-based communication program that can be reached using your nearest computer terminal. Through a series of questions that you answer, the system will assist you in leaving a written message that the secretary, Kathleen Resburg, will route to the individual you wish to communicate with.

All that is required to use the system is a terminal with a modem or acoustical coupler. The system can be accessed by calling (503) 231-2038 (commercial) or 429-2038 (FTS) between the hours of 4:00 p.m. and 10:00 a.m., Monday through Friday, Pacific time. The system will work on a 24-hour basis on weekends and holidays.

When you are calling, if your terminal has multiple settings, be sure the switches are set for:

1. Full Duplex
2. 300 BAUD
3. No Parity
4. Use of all uppercase letters.

If you have problems using the system, let the Program Manager's Office know and remedial action will be taken.

Late Arrivals — It Never Got There!

Last year the Pacific Northwest Forest and Range Experiment Station changed its Portland mailing address. The post office no longer forwards mail sent to the old post office box number. The U.S. Postal Zip Code also changed at that time. Please check your address list for PNW scientists in Portland and the Western U.S. Program Manager's Office to be sure that you have the new address:

Canada/United States Spruce Budworms Program-West
PNW Forest and Range Experiment Station
USDA Forest Service
809 N.E. Sixth Avenue
Portland, OR 97232

Western Spruce Budworm Sampling Standards

The Western U.S. Program has been using insect and defoliation sampling standards since 1979 in an attempt to assure linkage between the diverse collection of field studies on establishment, growth, and yield of host stands affected by western spruce budworm populations, and the number of insects causing the effects.

In an intensive 1-day workshop on March 30, the population dynamics researchers reassessed their sampling designs and set further standards for their work. Review of data available at that time led the team to conclude that a review and analysis of data being collected on insect population fix and defoliation are necessary.

Following the review and analysis of available data, the standards for 1981-82 were to be issued in June.

Farewells

Dr. Julius Rudinsky of Oregon State University passed away in December 1980. Dr. Rudinsky was principal investigator in research on the overwinter hibernation phase of western spruce budworm population dynamics. CANUSA welcomes Dr. Bruce Eldridge, Chairman of the Department of Entomology at Oregon State, who will continue Dr. Rudinsky's research.

We say a fond farewell to Peter McNamee, insect modeling expert, formerly of CANUSA-West, who accepted a position with Environment and Social Systems Analysts of Vancouver, B.C. The program will miss Peter's keen interest and expertise in modeling western spruce budworm population dynamics.

In The Family

Without too much exaggeration, it can be said that you're reading the CANUSA Newsletter today because of Dorothy Wilson. "In the Family" has chosen Ms. Wilson for its first subject because of her contributions behind the scenes to the success of our public information efforts. As management assistant in the USDA Forest Service's Washington information office, Dorothy handles the Newsletter mailing list. She's got your number!

In 24 years with the Forest Service, Dorothy Wilson has come to represent the best face of government. She devised a way to improve the distribution of Forest Service publications to field officers, while at the same time helping her favorite charity, the District of Columbia Association of Retarded Citizens.



In the past, FS publications were distributed by printers in the private sector, directly from their plants. The system worked sometimes, but field offices complained regularly about nondelivery. Dorothy believed that the retarded adults working at the Association's occupational training center could contribute to a more efficient mailing system. She contracted with the Association in 1977 to distribute all Forest Service publications from Washington to FS field offices nationwide. In 1979, the latest years for which figures are available, workers at the training center distributed more than 2 million documents at a cost of about $60 000.

Since the changeover, Dorothy says, "we haven't had any complaints about deliveries. It's going pretty smoothly." She encouraged the Forest Service to assign work to the training center "to give retarded persons the chance to show they are an asset to society."

The Association of Retarded Citizens honored Dorothy last fall for her exceptional achievement in helping to hire mentally handicapped persons. And the Forest Service also recognized her contributions with a certificate of merit. This is the International Year of Disabled Persons, but Dorothy didn't wait for 1981 to help the handicapped. We're lucky to have her as part of CANUSA's extended family.

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As space permits, future Newsletters will spotlight program staffers and investigators on both sides of the border. Janet Searcy, Washington Office Information Coordinator for the program, welcomes suggestions for interviewees worthy of "In The Family" coverage. Send your suggestions to her at P.O. Box 2417, RPE 602, Washington, DC 20013.

Funding For 1981 Spruce Budworms Research

The CANUSA-West proposals funded for 1981 are as follows:

1. Population dynamics of the western spruce budworm: Effects of natural enemies.
   R.W. Campbell and T.R. Torgersen,
   Forestry Sciences Laboratory,
   Corvallis, OR
2. Population behavior and natural enemy studies on the western spruce budworm.
   C. Hatch and T.R. Torgersen,
   University of Idaho
   Moscow, ID
3. Associates of western spruce budworm larvae.
   R. Stevens,
   Forestry Sciences Laboratory,
   Fort Collins, CO
4. Population dynamics of the western spruce budworm: Population monitoring of low and high density populations.
   R.C. Beckwith,
   Forestry Sciences Laboratory,
   Corvallis, OR
5. Impact of avian predation on western spruce budworm.
   E.O. Garton,
   University of Idaho,
   Moscow, ID
6. A determination of the effects of nitrogen and terpenes on western spruce budworm dynamics.
   R.G. Cates,
   University of New Mexico,
   Albuquerque, NM
7. Climatological range and constraints to western spruce budworm dispersal and abundance.
   D. Everson and D. Burnell,
   University of Idaho,
   Moscow, ID
8. Western spruce budworm larval consumption rates and host foliage damage.
   M. Wagner,
   Northern Arizona University,
   Flagstaff, AZ
9. Study factors determining the density and quality of western spruce budworm populations in New Mexico.
   W. Waters and J. Volney,
   University of California,
   Berkeley, CA
10. Mortality factors of early larvae of the western spruce budworm.
    B. Eldridge and I. Egan,
    Oregon State University,
    Corvallis, OR
11. Relationship between sapwood basal area, defoliation, and diameter growth of *Pseudotsuga menziesii* and *Abies grandis*.
    T. Hinckley,
    University of Washington,
    Seattle, WA
12. Development of models of spruce budworm defoliation-induced changes in tree yield and quality.
    D. Burnell,
    University of Idaho,
    Moscow, ID
13. Growth impacts on host trees due to western spruce budworm defoliation.
    G. Scott,
    University of Washington,
    Seattle, WA
14. The relationships of western spruce budworm outbreaks to site stand attributes, development, and management history: Model testing.
    K. Stoszek,
    University of Idaho,
    Moscow, ID

15. Impact of defoliation by spruce budworm on growth and development of young timber stands in Idaho.
M. Foiles,
Forestry Sciences Laboratory,
Moscow, ID

16. Effects of western spruce budworm on cone and seed production, Northern Rocky Mountain.
R. Shearer and C. Tiernan,
Forestry Sciences Laboratory,
Missoula, MT

17. The effects of spruce budworm on regeneration success in Idaho's ecosystems.
D. Ferguson,
Forestry Sciences Laboratory,
Moscow, ID

18. Extension of stand prognosis model to represent forests where western spruce budworm causes major damage.
A. Stage,
Forestry Sciences Laboratory,
Moscow, ID

19. Estimating economic impacts of western spruce budworm — East Side Habitat Region.
T. Bible,
Oregon State University,
Corvallis, OR

20. Effects of western spruce budworm tree defoliation on forested range values — An assessment based on current knowledge.
R. Zamora,
Washington State University,
Pullman, WA

21. The influences of silvicultural practices on the susceptibility and vulnerability of Northern Rocky Mountain forests to the western spruce budworm.
C. Carlson and D. Fellin,
Forestry Sciences Laboratory,
Missoula, MT

22. Formulation improvement trials with the Entomogenous Nematode *Neoaplectana carpocapsae*, for biological control of the western spruce budworm.
H.K. Kaya,
University of California,
Davis, CA

23. What is the potential for control of western spruce budworm using ground application of nuclear polyhedrosis virus (NPV) and granulosis virus (GV)?
M. Stelzer,
Forestry Sciences Laboratory,
Corvallis, OR

24. Management of vertebrate predation on western spruce budworm.
E.O. Garton,
University of Idaho,
Moscow, ID

25. Population dynamics of the western spruce budworm: Development of a population model.
C. Hatch and R.W. Campbell,
University of Idaho,
Moscow, ID

CANUSA-East Working Group News

Word has been received by CANUSA-East from Jean-Claude Mercier that he has taken on a new job, that of Assistant Deputy Minister for the Quebec Department of Energy and Resources. (Congratulations, Jean-Claude!) Because of the press of his new duties, Jean-Claude can no longer serve as a CANUSA-East Working Group Co-chairperson. At his suggestion, therefore, M. Louis Dorais has been asked to accept the position of Cochairperson of the IPM Planning and Decision Modeling Working Group, working with Christine Shoemaker (Cornell University), the U.S. Cochairperson. We anticipate a smooth transition and look forward to working closely with Louis and Christine in the future.

Recent Publications

If you are involved with sampling populations of spruce budworms or responsible for designing surveys, we have a new report which may be of interest to you: "The significance of non-host and alternative host tree species on populations of larval spruce budworm, with emphasis on improving sampling techniques." The report, by Bill Kemp (Environmental Associates, Inc., of Orono), is the result of a CANUSA-funded study into the influence of stand type and mixed stands on budworm oviposition. Bill has some interesting data to support his recommendation that both spruce and fir should be monitored for budworm populations, defoliation, and hazard rating. Usually only the fir is considered. If you'd like a copy of this, write to Dave Grimble in Broomall (Broomall, PA 19008), or contact Bill at the University of Idaho,Moscow, where he recently began his doctoral studies under Professor Ron Stark.

Three reports of interest to CANUSA program members are available from Environment New Brunswick.

"Monitoring of insecticide drift from forest spray operations and its effect on low bush blueberry in New Brunswick in 1980," by George W. Wood, Agriculture Canada.

"A chemical residue survey in relation to the 1980 spruce budworm spray program in New Brunswick — A pilot project," by Victorin N. Mallet, University of Moncton.

"Status report on research and development sponsored or supported by Forest Protection Limited, March, 1981."

These reports are available from: Environmental Services Branch, Environment New Brunswick, P.O. Box 6000, Fredericton, N.B. E3B 5H1.

In addition to the three reports now available, there will be available, in the near future, a report on the 1980 Environmental Protection Service — Environment New Brunswick joint study of buffer zone effectiveness and EPS bioassay work.

The University of Maine in Orono is the source of these two reports:

J.B. Dimond, C.J. Spies IV, and J. O'Neal. 1981. "Spruce budworms: Evaluation of B.t. trials in Maine, 1980." Miscellaneous Report 237.

J. Falk. 1980. "Wood damage on spruce-fir stands — a literature review with recommendations for harvesting methods." Miscellaneous Publication 225.

The reprint of an article published in Pulp and Paper Canada, Jan. 1981 is available from the authors, H.J. Irving and F.E. Webb. It is titled "Forest protection against spruce budworm in New Brunswick: An aerial applicator's perspective." The address is: Box 1030, Fredericton N.B. E3B 5C3

Two reports concerning effects of chemicals on the environment are available, as follows:

V. Zilko and D.W. McLeese. "Evaluation of hazards of pesticides used in forest spraying to the aquatic environment." Canadian Technical Report of Fisheries and Aquatic Science No. 985. Biological Station, Department of Fisheries and Oceans, St. Andrews, N.B. E0G 2X0.

P.D. Kingsbury, B.B. McLeod, and R.L. Millikin. "The environmental impact of nonylphenol and Matacil formulation. Part 2: Terrestrial ecosystems." Report FPM-X-36. Forest Pest Management Institute, Sault Ste. Marie, Ont. P6A 5M7.

Publications available from the USDA Forest Service, Davis, CA 95616, include:

J.W. Barry, I. Millers, and E.M. Richardson. 1980. "Spray characterization trials for the 1979 Maine spruce budworm control program." MAG Report 80-4.

A.T. Bullard and R.W. Young. 1980. "Prediction of western spruce budworm defoliation on Douglas-fir." MAG Report 80-10.

A.T. Bullard and J. Wong. 1981. "Evaluation of multiple regression models for prediction of western spruce budworm defoliation on Douglas-fir." MAG Report 81-1.

Other USDA Forest Service publications are:

I. Millers. 1980. "Reduced application rates of Orthene forest spray give less effective spruce budworm control in Maine — 1978." Report NA-TP-4. USDA Forest Service, Northeastern Area, State and Private Forestry, Broomall, PA 19008.

Harold O. Batzer and Arthur R. Hastings. 1980. "How to rate spruce-fir stands for vulnerability to spruce budworm damage in Minnesota." HT-46. USDA Forest Service, St. Paul, MN 55108.

J.M. Schmid. 1981. "Incidence of western spruce budworm parasites in New Mexico after aerial spraying with carbaryl." USDA Forest Service Research Note RM-397. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO 80521.

G.I. McDonald. 1981. "Differential defoliation of neighboring Douglas-fir trees by western spruce budworm." USDA Forest Service Research Note INT-306. Intermountain Forest and Range Experiment Station, Ogden, UT 84401.

N. Srivastava, R.C. Beckwith, R.W. Campbell, and T.R. Jorgensen. 1980. "A method for sampling western spruce budworm pupae." USDA Forest Service Research Note PNW-372. Pacific Northwest Forest and Range Experiment Station, Portland, OR 97232.

C.M. Olson and R.F. Martin. 1981. "Estimating biomass of shrubs and forbs in central Washington Douglas-fir stands." USDA Forest Service Research Note PNW-380. Pacific Northwest Forest and Range Experiment Station, Portland, OR 97232.

Protecting the people who prepare and apply pesticides is a major concern of both governments participating in the CANUSA Program. Einar Roget, chairman of the USDA Forest Service's integrated pest management working group, recently announced a new publication on this subject.

"Pesticide safety — guidelines for personnel protection" contains general information on the overall safe use of pesticides in forestry and complements directives established in the Forest Service Manual. The handbook was prepared by James Singer, of the Pacific Southwest Forest and Range Experiment Station in Davis, California. To obtain copies, write John W. Barry, Methods Application Group, 2801 Chiles Road, Suite B, Davis, CA 95616.

Current membership of the CANUSA Senior Management Groups

Canada	*U.S.A.*
F.L.C. Reed Assistant Deputy Minister Canadian Forestry Service	R. Max Peterson Chief USDA Forest Service

Joint Policy and Program Council

J.H. Cayford (cochairman) Acting Director-General Research and Technical Services, CFS	R.E. Buckman (cochairman) Deputy Chief for Research USDA Forest Service
Dr. G.W. Green Director Forest Pest Management Institute, CFS	E.L. Roget Deputy Chief for State and Private Forestry USDA Forest Service
D.R. Macdonald Director Pacific Forest Research Centre, CFS	J.D. Sullivan Deputy Administrator Natural Resources and Special Programs, Cooperation Research USDA Science and Education Administration
D.L. Eldridge Chairman Eastern Spruce Budworm Council	F.B. Knight Director School of Forest Resources, University of Maine

Joint Planning Unit

M.M. Neilson (cochairman) Director Maritimes Forest Research Centre, CFS	G.W. Anderson (cochairman) Director Forest Insect and Disease Research, USDA Forest Service
W.J. Carroll Director Newfoundland Forest Research Centre, CFS	J.D. Stewart Director Forest Pest Management, USDA Forest Service
T.E. Sterner Director Forest Insect and Disease Survey, CFS	K.G. Stratton Director Bureau of Forestry, Maine
G. Paquet Executive Secretary Eastern Spruce Budworm Council	J.M. Hughes Dean College of Forestry and Natural Resources Colorado State University

Note to readers: For complete addresses, consult the current International Directory.